

Integrated High-Speed Digital Optical True-Time-Delay Modules for Synthetic Aperture Radars, Phase I

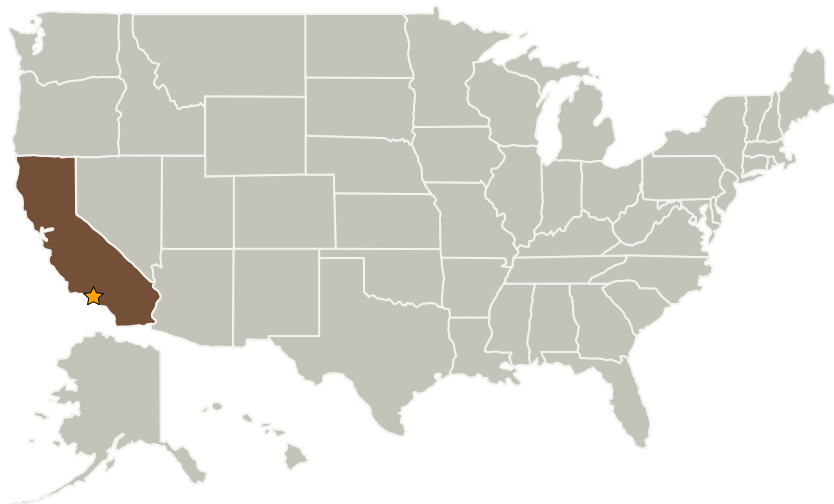
Completed Technology Project (2004 - 2004)



Project Introduction

Crystal Research, Inc. proposes an integrated high-speed digital optical true-time-delay module for advanced synthetic aperture radars. The unique feature of this proposed approach is that both the true-time-delay waveguide circuit and high-speed electro-optic switching elements are made by using a single polymeric waveguide system and are monolithically integrated in a single substrate. As a result, it significantly reduces the device size while eliminating the most difficult packaging problem associated with the delicate interfaces between optical fibers and optical switches. Such a monolithic approach offers great precision (0.11 microns) for the RF phase control due to the sub-micrometer accuracy of lithography-defined optical waveguide delay lines. More important, the proposed optical switched true-time-delay network requires very low electrical power consumption (< 1 micro watts) due to very low power operation of electrically-switchable electro-optic waveguide gratings. Furthermore, the electrically-switchable electro-optic waveguide gratings have a very fast switching speed (<50 micro seconds) that is at least 100 time faster than any existing commercial optical switches. Other advantages of using the proposed switched digital optical true-time-delay lines include: microwave true-time-delay compatible, small, light weight, low loss, and immune to electro-magnetic interfere.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Crystal Research, Inc.	Supporting Organization	Industry	Fremont, California

Primary U.S. Work Locations

California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Suning Tang

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - └ TX05.1 Optical Communications
 - └ TX05.1.3 Lasers